**LAB 3 - ASEXUAL PROPAGATION LAB**

Asexual propagation is used to reproduce or multiply many horticultural plants. Plants that are propagated asexually are genetically the same as the mother plant. This is also called cloning. Although cloning is being talked about a lot today, it is not a recent development. Farmers have been cloning crop plants since before recorded history. One of the oldest clones in existence is Thompson seedless grapes. The plant with the largest number of daughter plants is the navel orange. All clones originate from a single plant and all of the plants that are propagated from it, asexually, are genetically the same.

Some asexually propagated crops that are grown extensively are: tree fruits, cane fruits, strawberries, sugar cane, potatoes, sweet potatoes, cassava, cranberries, and most herbaceous and woody ornamental plants. Almost all the flower crops and green plants grown as greenhouse crops are also propagated asexually. Plants are propagated asexually for the following reasons: 1. to preserve the genetic characteristics of a particular plant; 2. to propagate plants that do not produce viable seeds (bananas, pineapple, seedless grape, etc.); 3. to propagate plants that produce seed that is difficult to germinate or has a very short storage life (cotoneaster, willow); 4. to bypass the juvenile stage of plant growth when the plants will not flower and bare fruit (apple).

By far the most important of these is the first. This is the main reason that many horticulture plants are propagated asexually.

Asexual propagation may be done by making cuttings from the stem, root or leaves of the desired plant. Stem cuttings are made by removing a small branch or twig from the plant. This cutting will usually contain two or more buds, one of which will grow into the top of the plant. With proper treatment, **adventitious**\* roots will be produced on the end of the cutting that was closest to the root of the original

plant. Root cuttings are made in a similar fashion, but produce an adventitious stem on the end of the cutting that was nearest to the stem of the original plant. Leaf cuttings produce both roots and stems when the leaf is placed under proper conditions.

\***adventitious** [not properly belonging to] Referring to a structure arising from an unusual place, such as buds at other places than leaf axils, or root growing from stems or leaves.

Grafting is another type of asexual propagation. In the process of grafting, a part of the stem of one plant is mechanically joined to the stem or root of another plant. If the graft is to be successful, the stem (scion) and the root (stock) must be closely related taxanomically. Grafting is used primarily for woody plants and most tree fruits are propagated in this manner. The scion may be a single bud (budding), or it may have several buds (grafting).

Some plants can be propagated asexually by dividing clumps of the plants. This is called division and is used for such plants as iris, some lilies, orchids, many house plants and perennials. In division, the clumps are cut or torn apart and the individual plants replanted. These will then make another clump which can be divided to keep the process going.

Plants can also be asexually propagated by layering. The process of layering is as if you rooted a cutting while it was still attached to the plant. There are several different ways to layer a plant, but generally the process involves placing a part of the plant stem under conditions favorable for rooting. Once roots have formed the new plant is separated from the mother plant and established in a new location.

Over the last several years tissue culture propagation has been perfected as a way to propagate plants asexually. Tissue culture uses very small cuttings that are sterilized and grown in test tubes under aseptic conditions. In some instance the cutting can be as small as a single cell isolated from various plant tissues.

Once the cutting (explant) is established in a test tube, the medium on which the explant is to grow can be modified to promote the production of numerous stems or roots. Usually the culture is first manipulated to produce many stems. These stems are then placed under cultural conditions to promote rooting. Plants can

be reproduced very rapidly using tissue culture methods. A single bud from a potato plant can be multiplied a million times in a single year.

**LAB EXERCISE 3 - ASEXUAL PROPAGATION – CUTTINGS**

**Objective:** To acquaint the student with some of the basic techniques used in propagating plants using cuttings

**Materials Needed:** Stock plants, knives, pruners, test tubes, rooting compound, pot labels, pencils.

Points of Emphasis: 1. Keep things clean. 2. Keep cultivars identified.

**Procedures:**

I. Preparation of herbaceous cutting: Select a plant to propagate

1. Select growing tips that are 2 to 3 inches long and contain at least 2 nodes.

Cut the tips from the stock plant. Remove leaves from the basal 1.5-2.0 inch (4 - 5 cm).

Make the cuttings as uniform as possible.

2. Each team should make 3 cuttings of one species.

3. Place your cuttings in test tubes provided

4. Label your test tubes:These should include your name, date, species (from kingdom to species page 245), treatment given. These must be in pencil or water proof ink or they will wash off.

3. Treat each group as follows:

Group 1: Water only

Group 2: water and Auxin/gibberellin liquid (one drop)

Group 3: water and magic powder (dab the recently cut end in the powder)

5. You will need to find a safe place for your cuttings, think about direct vs indirect sunlight, wind shelter, iguana shelter etc

4. Check the progress of you plants every other day for 10 days along with:

a. Change the water every other day along with replacing the Auxin drop and the magic powder (step 3)

5. Create a google doc with

a brief introduction of asexual reproduction (see lab sheet and pages 163 to 166)

b. A chart to keep track of root growth over the 10 days (new root growth measured in mm)

c. Observations during the trial.

d. Answers to the worksheet questions 1-6

**LAB 3 - WORKSHEET**

1. Tabulate data and make conclusions from observations.

2. Define asexual propagation. How does it differ from sexual propagation?

3. What are three reasons plants are propagated asexually?

4. Write a brief description of what Auxin is and what Gibberelilin is.

4. What is the purpose of applying growth regulators to plants?

5. List 4 environmental factors which are important in helping cuttings to develop roots.

6. Make a graph of the mean total root growth from the pool class data.